UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/708,240	02/18/2004	Louis L. Hsu	FIS920030319US1	2239

32074 7590 07/23/2007

INTERNATIONAL BUSINESS MACHINES CORPORATION
DEPT. 18G
BLDG. 300-482
2070 ROUTE 52
HOPEWELL JUNCTION, NY 12533

EXAMINER	
HUANG, DAVID S	

ART UNIT	PAPER NUMBER
2611	

MAIL DATE	DELIVERY MODE
07/23/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/708,240	HSU ET AL.	
	Examiner	Art Unit	
	David Huang	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 February 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *2/18/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The references listed in the Information Disclosure Statement filed on February 18, 2004 have been considered by the examiner (see attached PTO-1449 form or PTO/SB/08A and 08B forms).

Specification

2. The disclosure is objected to because of the following informalities: In the background of the invention, the words "twoTwo" (page 6, [0008]) and "adapterIt" (page 7, [0009]) appear to be a typographical errors.

Appropriate correction is required.

Claim Objections

3. **Claims 3, 4, 8-9, 11, 15, and 19-20** are objected to because of the following informalities:

The limitations for "said a low impedance state" and "said a high impedance state" are worded awkwardly (**claim 3**, lines 6 and 8). These references to previously established low and high impedance states do not need the article "a".

Claim 4 is dependent on claim 3, and therefore contains the same defects.

Claim 8 is missing a period to end the sentence.

Claim 9 is dependent on claim 8.

Claim 11 is worded awkwardly (lines 1-2). It is suggested to applicant to revise the limitation "*said* each of said default data transmitters" to remove the first "said."

Claim 15 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 15 merely restates the limitation that both data receivers and connection elements are operable at signal switching frequencies above about 500 MHz, which is already found in claim 14.

In **claim 19** (line 21), the recitation of "to said first input signal line and to first output signal line" is missing an article for the *first output signal line* limitation.

Claim 20, is dependent on claim 19.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. **Claims 2, 5-6, 11, and 12-20** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. **Claim 2** recites the limitation "said second input signal line" in line 7. There is insufficient antecedent basis for this limitation in the claim. It is unclear whether this recitation is indeed for a second input signal line or a typographical error meant to refer to the first signal input line. For examination on the merits, the claim will be interpreted as best understood.

Claims 5-6, and 11 are dependent on claim 2 and contain the same defects mentioned above.

7. The term "above about" in **claims 12, 14, and 18** is a relative term which renders the claim indefinite. The term "500 MHz" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. For examination on the merits, the claim will be interpreted as best understood.

Claims 13, 15-17, and 19-20 are dependent on the above rejected claims and either directly or indirectly contain the same defects as the claims they depend on.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9. **Claim 1** is rejected under 35 U.S.C. 102(e) as being anticipated by Wang (US Patent 7,212,738).

Regarding **claim 1**, Wang discloses an integrated circuit, comprising:

a plurality of data transmitters including a plurality of default data transmitters and at least one redundancy data transmitter (Transmitter bank 30, and Tx 52, Figure 1); and

a plurality of connection elements (switches 40, column 5, lines 62-65, Figure 1) having a first, low impedance connecting state (open state, column 5, lines 65-67), and having a second, high impedance, disconnecting state (reflective state, column 6, 1-5), at least a first connection element of said plurality of connection elements being operable to connect and disconnect a first

default data transmitter of said plurality of default data transmitters from a first output signal line, said first connection element further being operable to connect and disconnect said redundancy data transmitter from said first output signal line (column 9, lines 21-37; Figures 2 and 3).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. **Claims 2 and 11** are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang (US Patent 7,212,738) in view of Shioka et al. (US Patent 5,369,642).

Regarding **claim 2**, Wang discloses everything claimed as applied to claim 1 above, but fails to expressly disclose at least a second connection element of said plurality of connection elements is operable to connect and disconnect said first default data transmitter from a first input signal line, said second connection element further being operable to connect and disconnect said redundancy data transmitter from said second input signal line.

Nevertheless, Wang discloses in the event that a malfunctioning optical transmitter 36A is detected, the transmission control device 28 immediately transfers the electrical signal input from the malfunctioning optical transmitter to the backup transmitter 52 (column 8, lines 44-55, Figure 3).

Shioka et al. disclose a switcher (Figure 1) that has active transmitter (DT) 51 connected to input signal source 21 by path A, and standby DT 50 is connected to standby input source 40

by path B, in a faultless condition. When a fault occurs, standby DT 50 is connected to input signal source 41 by path C, and DT 51 is connected to standby input signal source 40 by path D, both through switching circuits 910 and 911. By using the standby input signal source 40 as a test signal source, it is possible to deliver a test signal to the faulty DT 51 for the purpose of locating the fault (column 3, lines 6-26, Figure 1).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide Wang with the switcher taught by Shioka et al. since it improves performance by enabling device redundancy and it also helps in locating faults (column 3, lines 23-26).

Regarding **claim 11**, Wang discloses everything claimed as applied above, but fails to expressly disclose said each of said default data transmitters provides a pair of differential signal outputs and receives a pair of differential signal inputs, such that said first output signal line includes a pair of differential signal conductors for receiving said differential signal outputs and said first input signal line includes a pair of differential signal conductors for providing said differential signal inputs.

Shioka et al. disclose signal lines 961 and 971 are each implemented as a balanced two-core cable whose impedance is equal to the characteristic impedance Z of the input signal sources 40-42 and DTs 50-52 connected to the input terminals 940-942 and output terminals 950-952 (column 3, lines 30-35). The switches and input and output terminals are each provided with a bipolar configuration (column 3, lines 1-3).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide Wang with the balanced two-core cable teaching of Shioka et al.

since it provides impedance matching which eliminates waveform distortion and falling levels of the transmission signals (column 3, lines 27-30).

12. **Claims 3-4** are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang (US Patent 7,212,738) in view of Manning (US Patent 5,552,743).

Regarding **claim 3**, Wang discloses everything claimed as applied to claim 1 above, but fails to expressly disclose each of said connection elements includes a fuse, wherein said fuse of said first connection element connects said first default data transmitter to said first output signal line when a first fuse of said first connection element is in said a low impedance state and disconnects said first default data transmitter from said first output signal line when said first fuse is in said a high impedance state.

However it is well known in the art that fuses and anti-fuses are state devices used to disable a defective portion or block of an integrated circuit and enable a redundant block, as is evidenced by Manning (column 1, lines 10-14). Semiconductor integrated circuits contain large numbers of electronic components built on a single chip. Due to the microscopic scale of these circuits, they are susceptible to component defects caused by material impurities and fabrication hazards (column 1, lines 16-22). Fuses are manufactured closed (high conductivity) and are blown open (very low conductivity) (column 1, lines 45-51).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide Wang with fuse and antifuse state devices since it is well known in the art that the use of these state devices to switch-in redundant components reduces waste by circumventing component defects caused by material impurities and fabrication hazards (column 1, lines 20-26).

Regarding **claim 4**, Wang discloses everything claimed as applied to claim 3 above, but fail to expressly disclose each of said connection elements further includes an antifuse fuse, wherein a first said antifuse of said first connection element connects said redundancy data transmitter to said first output signal line when said first antifuse is in said a low impedance state and disconnects said redundancy data transmitter from said first output signal line when said first antifuse is in said a high impedance state.

It is well known in the art that anti-fuses are manufactured open and are blown or programmed to the closed state, as is evidenced by Manning (column 1, lines 53-61).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the combination applied to claim 3 with anti-fuses since it is well known in the art that the use of anti-fuses to switch-in redundant components reduces waste by circumventing component defects caused by material impurities and fabrication hazards (column 1, lines 20-26).

13. **Claims 5 and 6** are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang (US Patent 7,212,738) in view of Shioka et al. (US Patent 5,369,642) as applied to claim 2 above, and further in view of Manning (US Patent 5,552,743).

Regarding **claim 5**, Wang and Shioka et al. disclose everything claimed as applied to claim 2 above, but fail to expressly disclose said first connection element includes a first fuse and said second connection element includes a second fuse, wherein said first connection element connects said first default data transmitter to said first output signal line when said first fuse is in a low impedance state and disconnects said first default data transmitter from said first output signal line when said first fuse is in a high impedance state and wherein said fuse of said

second connection element connects said first default data transmitter to said first input signal line when said second fuse is in a said low impedance state and disconnects said first default data transmitter from said first input signal line when said second fuse is in a said high impedance state.

However it is well known in the art that fuses and anti-fuses are state devices used to disable a defective portion or block of an integrated circuit and enable a redundant block, as is evidenced by Manning (column 1, lines 10-14). Semiconductor integrated circuits contain large numbers of electronic components built on a single chip. Due to the microscopic scale of these circuits, they are susceptible to component defects caused by material impurities and fabrication hazards (column 1, lines 16-22). Fuses are manufactured closed (high conductivity) and are blown open (very low conductivity) (column 1, lines 45-51).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the Wang and Shioka et al. with fuse and antifuse state devices since it is well known in the art that the use of these state devices to switch-in redundant components reduces waste by circumventing component defects caused by material impurities and fabrication hazards (column 1, lines 20-26).

Regarding **claim 6**, Wang and Shioka et al. disclose everything claimed as applied to claim 5 above, but fail to expressly disclose said first connection element further includes a first antifuse and said second connection element further includes a second antifuse, wherein said first connection element connects said redundancy data transmitter to said first output signal line when said first antifuse is in a low impedance state and disconnects said redundancy data transmitter from said first output signal line when said first antifuse is in a high impedance state

and said antifuse of said second connection element connects said redundancy data transmitter to said first input signal line when said second fuse is in said a low impedance state and disconnects said redundancy data transmitter from said first input signal line when said second fuse is in said a high impedance state.

It is well known in the art that anti-fuses are manufactured open and are blown or programmed to the closed state, as is evidenced by Manning (column 1, lines 53-61).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the combination applied to claim 5 with anti-fuses since it is well known in the art that the use of anti-fuses to switch-in redundant components reduces waste by circumventing component defects caused by material impurities and fabrication hazards (column 1, lines 20-26).

14. **Claims 7-8** are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang (US Patent 7,212,738) in view of Gutierrez et al. (US Patent Application Publication 2001/0048544).

Regarding **claim 7**, Wang discloses everything claimed as applied to claim 1 above, but fails to expressly disclose each of said plurality of connection elements includes a plurality of micro-electromechanical (MEM) switches, wherein a first MEM switch of said first connection element connects and disconnects said first default data transmitter to said first output signal line.

Nevertheless, Wang discloses when optical transmitter 36 malfunctions, the optical switch 40 is changed to the reflective state (column 6, lines 44-45).

Gutierrez et al. disclose MEMS optical switch including an element pivotably mounted on a platform formed on a baseplate. Electrodes are arranged on the platform such that the element may be fully deflected onto the linear segments in response to actuation forces (page 1,

[0006]-[0007]). Higher voltages may be used to provide faster motion and added robustness. Further, faster switching times may be achieved (page 2, [0026]). Gutierrez et al. also disclose MEMS optical mirrors have been developed for use in optical switches (page 1, [0003]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide Wang with the MEMS optical switch taught by Gutierrez et al. since it improves performance by providing faster motion and switching times (page 2 [0026]).

The combination of Wang and Gutierrez et al. discloses the claimed invention, but fail to expressly disclose a plurality of MEM switches. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a plurality of MEM switches, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. St. Regis Paper Co. v. Bemis Co., 193 USPQ 8.

Regarding **claim 8**, Wang and Gutierrez et al. disclose everything claimed as applied to claim 7 above, and Wang further discloses the backup channel 54, upon interacting with the switch 40 in its reflected state, is reflected by the switch back toward the diffraction grating 44 along a path identical to the first path 46A of the specified channel of the transmitter 36A before malfunction (column 9, lines 19-32, Figure 3).

15. **Claim 9** is rejected under 35 U.S.C. 103(a) as being unpatentable over Wang (US Patent 7,212,738) in view of Gutierrez et al. (US Patent Application Publication 2001/0048544) as applied to claim 8 above, and further in view of Shioka et al. (US Patent 5,369,642).

Regarding **claim 9**, Wang discloses everything claimed as applied to claim 8 above, but fails to expressly disclose a first MEM switch of a second connection element of said plurality of connection elements connects and disconnects said first default data transmitter to said first input

signal line and second MEM switch of said second connection element connects and disconnects said redundancy data transmitter to said first input signal line.

Shioka et al. disclose a switcher (Figure 1) that has active transmitter (DT) 51 connected to input signal source 21 by path A, and standby DT 50 is connected to standby input source 40 by path B, in a faultless condition. When a fault occurs, standby DT 50 is connected to input signal source 41 by path C, and DT 51 is connected to standby input signal source 40 by path D, both through switching circuits 910 and 911. By using the standby input signal source 40 as a test signal source, it is possible to deliver a test signal to the faulty DT 51 for the purpose of locating the fault (column 3, lines 6-26, Figure 1).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide Wang and Gutierrez et al. with the switcher taught by Shioka et al. since it improves performance by enabling device redundancy and it also helps in locating faults (column 3, lines 23-26).

16. **Claim 10** is rejected under 35 U.S.C. 103(a) as being unpatentable over Wang (US Patent 7,212,738) in view of Gutierrez et al. (US Patent Application Publication 2001/0048544) as applied to claim 7 above, and further in view of Sun et al. (US Patent 6,307,169).

Regarding **claim 10**, the combination of Wang and Gutierrez et al. discloses everything claimed as applied to claim 7 above, but fails to expressly disclose wherein said plurality of MEM switches include MEM switches of the type having a signal pad restrained by a plurality of hinge brackets for movement in a substantially vertical direction in response to electrostatic force to switch between a connecting state and a disconnecting state.

Sun et al. disclose a MEMS switch having a double hinge membrane-type control electrode with center flex. Each end of the electrode is hinged or anchored to a post, spacer , via or other type of stationary vertical structure. Thus, when the appropriate voltage is applied between the two control electrodes, the membrane-type hinged electrode flexes as the center, i.e., between the two hinges, in the direction of the opposite electrode. When the voltage is removed., the natural resiliency of the membrane-type electrode returns it to its normally horizontal, open state (column 1, lines 25-38).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the combination of Wang and Gutierrez et al. with the MEMS switch taught by Sun et al. since it reduces power consumption by using the natural resiliency of the membrane to change to an open state(column 1 lines 35-38).

17. **Claims 12-15** are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang (US Patent 7,212,738) in view of Williamson, III et al. (US Patent 6,632,029) and Nashimoto et al. (US Patent 6,470,125).

Regarding **claim 12**, Wang discloses everything claimed as applied to claim 1 above, but fails to expressly disclose said plurality of data transmitters are operable at signal switching frequencies above about 500 MHz and said connection elements present said first, low impedance connecting state at frequencies including said signal switching frequencies above about 500 MHz.

Nevertheless, Wang discloses optical communications networks are marked by high bandwidth and reliable, high-speed data transmission. Optical transmitters which modulates signals using wavelength division multiplexing (WDM) (column 1, lines 21-42).

Williamson, III et al. disclose a package with radio frequency (RF) shielding for high speed optical transmitter and receiver combination for short and intermediate range information transfer at high data rates (1 MHz-40 GHz). The package may be fabricated with relatively low cost and a reduced form factor when capered with prior art opto-electrical packages (column 4, lines 9-31).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide Wang with the package taught by Williamson, III et al. since it would reduce the cost and size of a high speed optical transmitter and receiver combination.

The combination of Wang and Williamson, III et al. fail to expressly disclose that said connection elements present said first, low impedance connecting state at frequencies including said signal switching frequencies above about 500 MHz.

Nashimoto et al. disclose an optical switch that has a switching frequency higher than 100 MHz (column 16, lines 10-11).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the combination of Wang and Williamson, III et al. with the optical switch taught by Nashimoto et al. since it improves performance through high speed drive, excellent temperature stability, low drive voltage, and low crosstalk and insertion loss (column 4, lines 53-57).

Regarding **claim 13**, the combination of Wang, Williamson, III et al., and Nashimoto et al. discloses everything claimed as applied to claim 12, and Wang further discloses a plurality of data receivers operable at signal switching frequencies above about 500 MHz, said plurality of data receivers including a plurality of default data receivers (receiver bank 72) and at least one

redundancy data receiver (backup optical receiver 90), wherein at least a second connection element (switch 86) of said plurality of connection elements is operable to connect and disconnect a first default data receiver of said plurality of default data receivers from a first input signal line, said second connection element further being operable to connect and disconnect said redundancy data receiver from said first input signal line (column 11, line 59 – column 12, line 11; see Figure 5).

Regarding **claims 14 and 15** (see relevant objection above), Wang discloses an integrated circuit, comprising:

a plurality of data receivers (84 and 90, Figure 1),

said plurality of data receivers including a plurality of default data receivers (84) and at least one redundancy data receiver (90); and

a plurality of connection elements having a first, low impedance connecting state, and having a second, high impedance, disconnecting state (switches 86, column 10, lines 52-55, Figure 1),

at least a first connection element of said plurality of connection elements being operable to connect and disconnect a first default data receiver of said plurality of default data receivers from a first output signal line (switch 86 corresponding to failed receiver 84A, column 11, lines 59-65, Figure 5),

said first connection element further being operable to connect and disconnect said redundancy data receiver from said first output signal line (switch 86, column 11, lines 65-67, Figure 5).

However, Wang fails to explicitly disclose (1) the plurality of data receivers operate at signal switching frequencies above about 500 MHz, and (2) the plurality of connection elements have a first, low impedance connecting state at signal switching frequencies above about 500 MHz.

Regarding *item 1*, Williamson, III et al. disclose a package with radio frequency (RF) shielding for high speed optical transmitter and receiver combination for short and intermediate range information transfer at high data rates (1 MHz-40 GHz). The package may be fabricated with relatively low cost and a reduced form factor when capered with prior art opto-electrical packages (column 4, lines 9-31).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide Wang with the package taught by Williamson, III et al. since it would reduce the cost and size of a high speed optical transmitter and receiver combination.

Regarding *item 2*, Nashimoto et al. disclose an optical switch that has a switching frequency higher than 100 MHz (column 16, lines 10-11).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the combination of Wang and Williamson, III et al. with the optical switch taught by Nashimoto et al. since it improves performance through high speed drive, excellent temperature stability, low drive voltage, and low crosstalk and insertion loss (column 4, lines 53-57).

18. **Claim 16** is rejected under 35 U.S.C. 103(a) as being unpatentable over Wang (US Patent 7,212,738) in view of Williamson, III et al. (US Patent 6,632,029) and Nashimoto et al. (US

Patent 6,470,125) as applied to claim 14 above, and further in view of Manning (US Patent 5,552,743).

Regarding **claim 16**, the combination applied to claim 14 above fails to expressly disclose each of said plurality of connection elements includes a fuse, wherein a first default data receiver of said plurality of default data receivers is connected and disconnected to said first output signal line by a fuse of a first connection element of said plurality of connection elements.

However it is well known in the art that fuses and anti-fuses are state devices used to disable a defective portion or block of an integrated circuit and enable a redundant block, as is evidenced by Manning (column 1, lines 10-14). Semiconductor integrated circuits contain large numbers of electronic components built on a single chip. Due to the microscopic scale of these circuits, they are susceptible to component defects caused by material impurities and fabrication hazards (column 1, lines 16-22). Fuses are manufactured closed (high conductivity) and are blown open (very low conductivity) (column 1, lines 45-51).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the combination of Wang, Williamson, III et al., and Nashimoto et al. with fuse and antifuse state devices since it is well known in the art that the use of these state devices to switch-in redundant components reduces waste by circumventing component defects caused by material impurities and fabrication hazards (column 1, lines 20-26).

19. **Claim 17** is rejected under 35 U.S.C. 103(a) as being unpatentable over Wang (US Patent 7,212,738) in view of Williamson, III et al. (US Patent 6,632,029) and Nashimoto et al. (US Patent 6,470,125) as applied to claim 14 above, and further in view of Gutierrez et al. (US Patent Application Publication 2001/0048544).

Regarding **claim 17**, the combination applied to claim 14 fails to expressly disclose each of said plurality of connection elements includes a plurality of micro-electromechanical (MEM) switches, wherein a first default data receiver of said plurality of default data receivers is connected and disconnected to said first output signal line by a first MEM switch of a first connection element of said plurality of connection elements.

Gutierrez et al. disclose MEMS optical switch including an element pivotably mounted on a platform formed on a baseplate. Electrodes are arranged on the platform such that the element may be fully deflected onto the linear segments in response to actuation forces (page 1, [0006]-[0007]). Higher voltages may be used to provide faster motion and added robustness. Further, faster switching times may be achieved (page 2, [0026]). Gutierrez et al. also disclose MEMS optical mirrors have been developed for use in optical switches (page 1, [0003]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide Wang, Williamson, III et al., and Nashimoto et al. with the MEMS optical switch taught by Gutierrez et al. since it improves performance by providing faster motion and switching times (page 2 [0026]).

The combination of Wang, Williamson, III et al., Nashimoto et al. and Gutierrez et al. discloses the claimed invention, but fail to expressly disclose a plurality of MEM switches. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a plurality of MEM switches, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. St. Regis Paper Co. v. Bemis Co., 193 USPQ 8.

20. **Claims 18** is rejected under 35 U.S.C. 103(a) as being unpatentable over Wang (US Patent 7,212,738) in view Nashimoto et al. (US Patent 6,470,125) and Shioka et al. (US Patent 5,369,642).

Regarding **claim 18**, Wang discloses a method of performing redundancy replacement for an integrated circuit including a plurality of data transmitters operable at signal switching frequencies above about 500 MHz, comprising:

providing a plurality of data transmitters of said integrated circuit including a plurality of default data transmitters and at least one redundancy data transmitter (38 and 52, Figure 1);

providing a plurality of input signal lines and a plurality of output signal lines (column 5, lines 42-52, Figure 1);

providing a plurality of connection elements on said integrated circuit having a low impedance connecting state, and having a high impedance, disconnecting state (40, column 5, lines 62-65);

connecting a first default data transmitter of said plurality of data transmitters through a second connection element of said plurality of connection elements to a first output signal line of said plurality of output signal lines (column 6, lines 34-43, Figure 1);

disconnecting said first default data transmitter from said first output signal line by altering said second connection element to present said high impedance, disconnecting state to said first default data transmitter (column 5, lines 65-67, and column 9, lines 21-25, Figure 3); and

connecting said redundancy data transmitter to said first input signal line and to first output signal line by altering said second connection element to present said low impedance connecting state to said redundancy data transmitter (column 9, lines 25-37, Figure 3).

However, Wang fails to expressly disclose (1) the plurality of connection elements on said integrated circuit have a low impedance connecting state at signal switching frequencies above about 500 MHz, (2) connecting the first default data transmitter of said plurality of data transmitters through a first connection element of said plurality of connection elements to a first input signal line of said plurality of input signal lines, and (3) disconnecting said first default data transmitter from said first input signal line by altering said first connection elements to present said high impedance, disconnecting state to said first default data transmitter.

Regarding *item 1*, Nashimoto et al. disclose an optical switch that has a switching frequency higher than 100 MHz (column 16, lines 10-11).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide Wang with the optical switch taught by Nashimoto et al. since it improves performance through high speed drive, excellent temperature stability, low drive voltage, and low crosstalk and insertion loss (column 4, lines 53-57).

Regarding *item 2*, Shioka et al. disclose a switcher (Figure 1) that has active transmitter (DT) 51 connected to input signal source 21 by path A, and standby DT 50 is connected to standby input source 40 by path B, in a faultless condition. When a fault occurs, standby DT 50 is connected to input signal source 41 by path C, and DT 51 is connected to standby input signal source 40 by path D, both through switching circuits 910 and 911. By using the standby input

signal source 40 as a test signal source, it is possible to deliver a test signal to the faulty DT 51 for the purpose of locating the fault (column 3, lines 6-26, Figure 1).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide Wang and Nashimoto et al. with the switcher taught by Shioka et al. since it improves performance by enabling device redundancy and it also helps in locating faults (column 3, lines 23-26).

21. **Claim 19** is rejected under 35 U.S.C. 103(a) as being unpatentable over Wang (US Patent 7,212,738) in view Nashimoto et al. (US Patent 6,470,125) and Shioka et al. (US Patent 5,369,642) as applied to claim 18 above, and further in view of Williamson, III et al. (US Patent 6,632,029).

Regarding **claim 19**, Wang discloses everything claimed as applied to claim 18 above, and further discloses:

providing a plurality of data receivers of said integrated circuit including a plurality of default data receivers and at least one redundancy data receiver (84 and 90, Figure 4);

connecting a first default data receiver (Rx 84, Figure 4) of said plurality of data receivers through a first connection element of said plurality of connection elements (switch 86, Figure 4) to a first input signal line of said plurality of input signal lines and connecting said first default data receiver to a first output signal line of said plurality of output signal lines (column 11, lines 1-4, 14-22, Figure 4);

disconnecting said first default data receiver from said first input signal line by altering said first and second connection elements to present said high impedance, disconnecting state to said first default data receiver (column 11, lines 59-67, Figure 5); and

connecting said redundancy data receiver to said first input signal line and to said first output signal line by altering said first connection element to present said low impedance connecting state to said redundancy data receiver (column 12, lines 13-30, 34-38), wherein said connection elements present said low impedance connecting state at frequencies including said signal switching frequencies above about 500 MHz.

However, Wang fails to expressly disclose (1) said data receivers and said data transmitters are operable at signal switching frequencies above about 500 MHz; (2) connecting said first default data receiver through a second connection element of said plurality of connection elements to a first output signal line of said plurality of output signal lines; (3) disconnecting said first default data receiver from said first output signal line by altering said second connection element to present said high impedance, disconnecting state to said first default data receiver; and (4) connecting said redundancy data receiver to said first output signal line by altering said second connection element to present said low impedance connecting state to said redundancy data receiver.

Regarding *item 1*, Williamson, III et al. disclose a package with radio frequency (RF) shielding for high speed optical transmitter and receiver combination for short and intermediate range information transfer at high data rates (1 MHz-40 GHz). The package may be fabricated with relatively low cost and a reduced form factor when capered with prior art opto-electrical packages (column 4, lines 9-31).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the combination applied to claim 18 with the package taught by

Williamson, III et al. since it would reduce the cost and size of a high speed optical transmitter and receiver combination.

Regarding *items 2-4*, Shioka et al. disclose a switcher (Figure 1) that has active transmitter (DT) 51 connected to input signal source 21 by path A, and standby DT 50 is connected to standby input source 40 by path B, in a faultless condition. When a fault occurs, standby DT 50 is connected to input signal source 41 by path C, and DT 51 is connected to standby input signal source 40 by path D, both through switching circuits 910 and 911. By using the standby input signal source 40 as a test signal source, it is possible to deliver a test signal to the faulty DT 51 for the purpose of locating the fault (column 3, lines 6-26, Figure 1).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide Wang and Nashimoto et al. with the switcher taught by Shioka et al. since it improves performance by enabling device redundancy and it also helps in locating faults (column 3, lines 23-26).

22. **Claim 20** is rejected under 35 U.S.C. 103(a) as being unpatentable over Wang (US Patent 7,212,738) in view Nashimoto et al. (US Patent 6,470,125), Shioka et al. (US Patent 5,369,642), and Williamson, III et al. (US Patent 6,632,029) as applied to claim 19 above, and further in view of Gutierrez et al. (US Patent Application Publication 2001/0048544).

Regarding **claim 20**, the combination applied to claim 19 fails to expressly disclose wherein each of said plurality of connection elements includes a plurality of micro electro-mechanical (MEM) switches, wherein said first default data transmitter is connected and disconnected to said first output signal line through a first MEM switch of said first connection

element and is connected and disconnected to said first input signal line through a first MEM switch of said second connection element.

Gutierrez et al. disclose MEMS optical switch including an element pivotably mounted on a platform formed on a baseplate. Electrodes are arranged on the platform such that the element may be fully deflected onto the linear segments in response to actuation forces (page 1, [0006]-[0007]). Higher voltages may be used to provide faster motion and added robustness. Further, faster switching times may be achieved (page 2, [0026]). Gutierrez et al. also disclose MEMS optical mirrors have been developed for use in optical switches (page 1, [0003]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide Wang, Williamson, III et al., and Nashimoto et al. with the MEMS optical switch taught by Gutierrez et al. since it improves performance by providing faster motion and switching times (page 2 [0026]).

The combination of Wang, Nashimoto et al., Shioka et al., Williamson, III et al., and Gutierrez et al. discloses the claimed invention, but fail to expressly disclose a plurality of MEM switches. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a plurality of MEM switches, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. St. Regis Paper Co. v. Bemis Co., 193 USPQ 8.

Citation of Pertinent Prior Art

23. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Alter (US Patent 6,711,046) discloses zener diodes used as anti-fuses and a programmed array of fuses.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Huang whose telephone number is (571) 270-1798. The examiner can normally be reached on Monday - Friday, 8:00 a.m. - 5:00 p.m., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shuwang Liu can be reached on (571) 272-3036. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DSH/dsh
7/17/2007

Shuwang Liu

SHUWANG LIU
SUPERVISORY PATENT EXAMINER